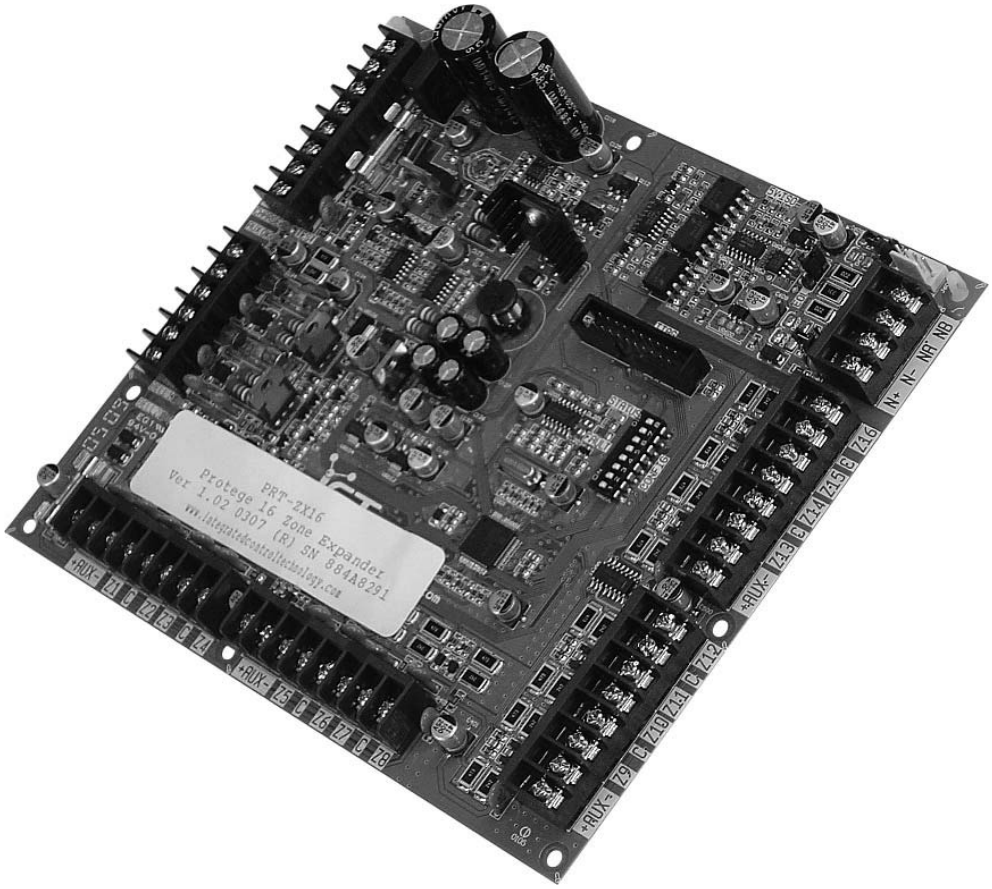
PRT-ZX16
16 Zone Input Expander



Installation Manual

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PROTÉGÉ SYSTEM

Introduction

The Protégé System is a powerful integrated alarm and access control management system designed to provide integration with building automation, apartment complex control and HVAC in one flexible package. Communicating through a proprietary high speed protocol across an encrypted RS-485 network using modular-based hardware design, system installers have the flexibility to accommodate any installation from small or large, residential or commercial.

Zone Expander

The PRT-ZX16 Protégé Zone Expander extends the number of zone inputs on the system by 16 and the number of PGM outputs by 4 (includes 2 monitored bell control outputs).

Flexible module network architecture allows large numbers of modules to be connected to the RS-485 Module Network. Up to 250 modules can be connected to the Protégé System in any combination to the network up to a distance of 900M (3000ft). Communication beyond this distance requires the use of a RS-485 Network Extender.

Locking a network prevents the removal, substitution or addition of modules to the module network effectively preventing any tampering with the system.

Features

- Secure Encrypted RS-485 Module Communications
- 16 Zone Inputs
- 2 Monitored Bell Control PGM Outputs (High Current)
- 2 Open Collector PGM Outputs (50mA)
- 1.5A Switching Power Supply
- Intelligent Battery Charge and Monitoring
- Online and Remote upgradeable firmware

Zone Expander Specifications

The following specifications are important and vital to the correct operation of the PRT-ZX16 Protégé 16 Zone Expander. Failure to adhere to the specifications will result in any warranty or guarantee that was provided becoming null and void.

Integrated Control Technology continually strives to increase the performance of its products and as a result the specifications may change without notice. It is recommended that you always consult www.integratedcontroltechnology.com for the latest documentation and product information.

Power Supply

AC Input Voltage	16VAC 50/60Hz @ 40VA (Max)
Operating Current	280mA (Typical)

DC Output (Auxiliary)	1.2A (Max)
Battery Charging	350mA/700mA
Battery Low	10.5VDC
Battery Restore	11.5VDC
Communication	
RS-485	Isolated Module Network
Outputs	
Bell Outputs	2 Outputs 2A (Max), 2.8A Shutdown
PGM Outputs	2 (50mA Max) Open Collector
Status Output	50mA (Max) Open Collector
Inputs	
Zone	16 (500ms to 40sec Input Speed)
Tamper	1 (Normally Closed)
Trouble Zone	16
Dimensions	
PCB Dimensions	183mm X 162mm 7.2" X 6.4"
Enclosure	330mm X 406mm X 89mm 13" X 16" X 3.5"
Temperature	
Operating	5°- 55° Celsius 41° - 131° Fahrenheit
Humidity	0%-85% (Non-Condensing)
Storage	-10°- 85° Celsius 14° - 185° Fahrenheit

It is important that the unit is installed in a dry cool location that is not affected by humidity. Do not locate the unit in air conditioning or a boiler room that can exceed the temperature or humidity specifications.

The isolated communications interface on the Protégé Zone Expander uses full galvanic isolation to prevent ground loop noise and cross phase ground differential. This is a very important feature of the product family and the correct connection of power to this isolated section will ensure the correct operation of the communications network. Failure to apply power to the communication interface will prevent the operation of the communication interface.

Protégé System Management Suite

The Protégé System Management Suite is a Windows 2000/XP Professional Integrated Access Control and Alarm Management system designed for any configuration from single site, single controller applications up to the global multi-national corporations using multiple site, multiple controller installations.

The Protégé System Management Suite application is ideal for the configuration and management of your Protégé installation. Special built in features and the quick-start kit will get your system up and running in minutes.

Protégé Modules

The Protégé System can be expanded to accommodate large numbers of modules using the encrypted RS-485 network. Modules that are currently available are listed below. Visit the Integrated Control Technology website www.integratedcontroltechnology.com for the latest Protégé module and product information.

Alphanumeric LCD User Interface (PRT-KLCD)

The Protégé LCD User Interface Keypad is the interface between the user and the Protégé System. All programming and end user functions can be performed using the LCD Keypad. The 32 character alphanumeric display uses easy to read messages and menus to guide users through the systems operation. The LCD Keypad also adds two zones (four zones in multiple zone configuration) and one PGM to the Protégé System.

16 Zone Expansion Module (PRT-ZX16)

Extends the Protégé System with the addition of 16 Zones and 4 Programmable Outputs (PGM's). Operates from 16VAC with onboard power supply and isolated communication interface.

16 Zone Standard Expansion Module (PRT-ZXS16)

Extends the Protégé System with the addition of 16 Zones and 1 Programmable Output (PGM). Operates from 12VDC network connection. No onboard power supply.

16 PGM Expansion Module (PRT-PX16)

Extends the Protégé System with the addition of 16 Programmable Outputs (PGM's) (16 7A FORM C Relays). The PRT-PX16 can be connected to the slave communications interface of the PRT-RDI2 2 Reader Expansion Module for FULL monitored elevator control with the addition of the PRT-DRI Destination Reporting Interface Optical Input Module.

16 PGM Standard Expansion Module (PRT-PXS16)

Extends the Protégé System with the addition of 16 Programmable Outputs (PGM's) (16 20mA Open Collector Outputs). Operates from 12VDC network connection. No onboard power supply.

Ethernet Intelligent 2 Reader Expansion Module (PRT-RDE2)

Communicating over a high speed interface using 10/100 Ethernet, interface connection for two card readers, either Wiegand or Magnetic Stripe formats. Four Wiegand Card Readers can be connected in Multiple Card mode. The 2 Reader Ethernet Expansion Module also adds 8 Zones and 8 Outputs to the Protégé System. Some of the outputs on the PRT-RDE2 have specific access control functions and can be used as zones in the Protégé alarm processing functions.

Intelligent 2 Reader Expansion Module (PRT-RDI2)

Adds the interface connection for two card readers, either Wiegand or Magnetic Stripe formats. Four Wiegand Card Readers can be connected in Multiple Card mode. The 2 Reader Expansion Modules also adds 8 Zones and 8 Outputs to the Protégé System. Some of the outputs on the PRT-RDI2 have specific access control functions and can be used as zones in the Protégé alarm processing functions.

Mini 2 Reader Expansion Module (PRT-RDM2)

Adds the interface connection for two card readers, either Wiegand or Magnetic Stripe formats. Four Wiegand Card Readers can be connected in Multiple Card mode. The 2 Reader Expansion Modules also adds 6 Zones and 8 Outputs to the Protégé System. Some of the outputs on the PRT-RDM2 have specific access control functions and can be used as zones in the Protégé alarm processing functions.

Analog 4 Channel Input Expansion Module (PRT-ADC4)

Protégé allows the connection of the latest building automation technology and completely integrated building automation solutions. Adds 4 Analog Inputs (4-20mA or 0-10V) allowing the connection of numerous industrial automation sensors. The Analog Input Expansion Modules also adds 4 PGM Outputs to the Protégé System.

Analog 4 Channel Output Expansion Module (PRT-DAC4)

Protégé allows the connection of the latest building automation technology and completely integrated building automation solutions. Adds 4 Analog Outputs (4-20mA or 0-10V) allowing the connection of numerous industrial automation outputs including air damper and sun louver controls as well as analog flow valves. The Analog Output Expansion Modules also adds 4 PGM Outputs to the Protégé System.

INSTALLATION

Package Contents

When receiving the PRT-RDI2 Protégé Zone Expander you should find the kit contains the items listed below. The kit type is clearly labelled on the packaging and will tell you what your kit contains. Please note that if you do not have the correct contents contact your distributor immediately.

PRT-ZX16-PCB **Protégé 16 Zone Expander PCB Only**

Contents:
- *Zone Expander Printed Circuit Board*
- *6 X Plastic Mounting Standoffs*
- *36 X 1K Ohm Resistors*
- *Red/Black Backup Battery Wires*

Location and Mounting

The Protégé Zone Expander is available as a PCB Only (Printed Circuit Board) or complete unit supplied with a metal cabinet. It is recommended that the cabinet provided be used where possible, as this provides the best mounting and installation solution as well as the required cable entry and termination space.

When installing the Protégé Zone Expander ensure that there is adequate clearance around all sides of the enclosure and air flow to the vents of the enclosure are not restricted.

It is recommended to install the Protégé Zone Expander in a location that will facilitate easy access for wiring. It is also recommended that the Protégé Zone Expander is installed in electrical rooms, communication equipment rooms, closets or in an accessible area of the ceiling.

1. Insert the plastic stand-offs in to the locations to mount the PCB board.
2. Calculate the location and position of the enclosure and mark the holes for the keyhole points in the top left and right locations. This will allow you to screw in the screws and then hang the box on them adjusting the location to suit.
3. Ensure a solid fixing point and screw in the two screws. Before tightening the top screws insert the tamper bracket in the slot provided on the right side of the enclosure.
4. Fix the enclosure securely using the remaining mounting holes on the bottom left, right and centre of the enclosure.
5. Insert the PCB in to the enclosure and mount using the plastic standoffs inserted during step one.

Install the enclosure when the circuit board is NOT installed on the plastic stand-offs. This will reduce the risk of damage caused by debris during the installation process.

Cabinet Tamper Switch

The enclosure tamper input signals to the monitoring station or remote computer that the Zone Expander enclosure has been opened. The tamper input switch should be mounted into the steel bracket provided and connected to the tamper connection terminals as shown in the diagram below. The tamper input opens and closes trouble zone ZXxxx:01 on the zone expander.

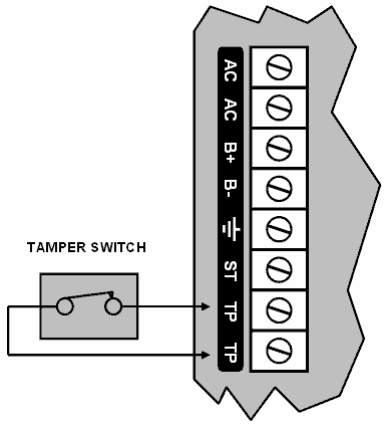


Figure 1 - Tamper Input

Earth Ground Connection

The Protégé Zone Expander has a connection for earth ground. For best results a cold water pipe should be used with a pipe wiring clamp. If a cold water pipe is not available connect to a suitable ground connection in the installation.

A minimum 14AWG solid copper wire should be used from the Protégé Zone Expander's earth connection point to the clamp on the cold water pipe. If other earth clamps are present at the same connection point connect the clamp below the existing units.

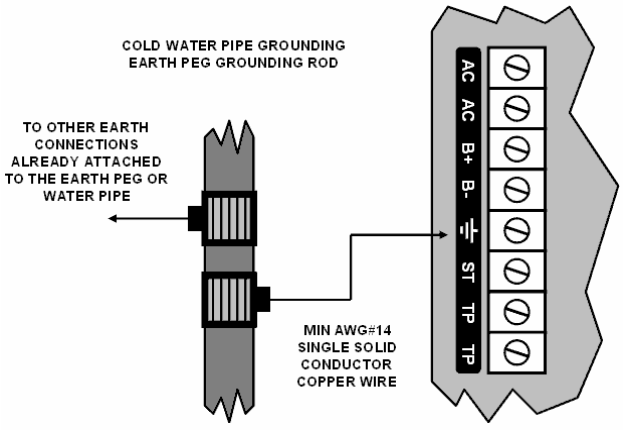


Figure 2 - Zone Expander Main Earth Ground Connections

AC Power

The Protégé Zone Expander should be supplied by a dedicated electrical power source rated for a minimum 10Amp Load and have a dedicated circuit breaker. Do not use a switch controlled breaker or a switched electrical point to supply electrical power. Connect the primary of a 16.5VAC, 50/60Hz, 40VA Transformer to the electrical circuit and run the secondary to the AC input on the controller terminals.

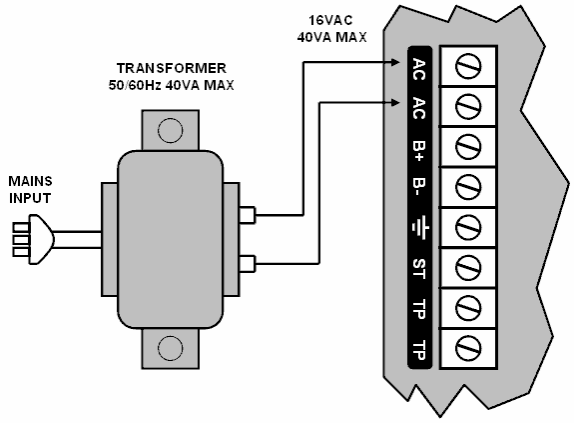


Figure 3 - AC Transformer 16VAC, 50/60Hz, 40VA MAX

Specific regional regulations may allow the transformer to be mounted inside the enclosure. In this case wire the electrical circuit to the electrical termination point inside the enclosure and the secondary wires of the transformer to the AC Input on the controller.

Termination of wiring to the Zone Expander while power is applied or the battery is connected may cause serious damage to the Zone Expander and will VOID ALL WARRANTEES OR GUARANTEES. Power the Zone Expander ONLY after all wiring, configuration and jumper settings are completed.

Backup Battery

It is recommended that a minimum of a 4Ah battery is used as the main backup battery. From the accessory bag provided, connect the RED and BLACK battery termination wires to the B+ and B- terminals. Connect the spade terminals to the battery as shown below. Connection of the battery in reverse will not damage the Zone Expander but will cause the battery fuse (5A Fast Blow) to blow and require replacement.

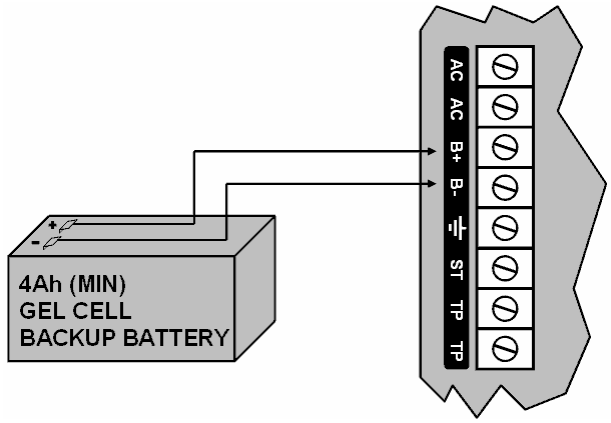


Figure 4 - Battery Connection

The battery test procedure uses a special algorithm to prevent deep discharge and increase battery endurance. A dynamic battery test is performed every ten minutes when AC power is present and a battery condition alarm will be generated if the battery is either disconnected or shows poor capacity. Battery fault conditions will activate the battery trouble zone associated with the address assigned to the zone expander.

If AC is not present the Protégé Zone Expander will monitor the battery for a low voltage level and will activate the battery trouble zone. The next dynamic battery test will occur 30 minutes after AC power has been restored. This delay allows the battery to achieve optimal charging during the first 30 minutes when power is initially restored to the unit. Once the first test is completed the dynamic battery testing will return to 10 minute intervals.

When power is first applied to the Protégé Zone Expander a dynamic battery test will be performed after 30 seconds, this allows the status and condition of the battery to be detected. On completion of this first test the normal testing period of 10 minutes will be resumed.

Status Indicator

The status output will activate according to the status indicator on the Protégé Zone Expander and can be used to provide signalling or indication of the Zone Expander status outside the enclosure. The following diagrams show the connection of an LED indicator to the status output.

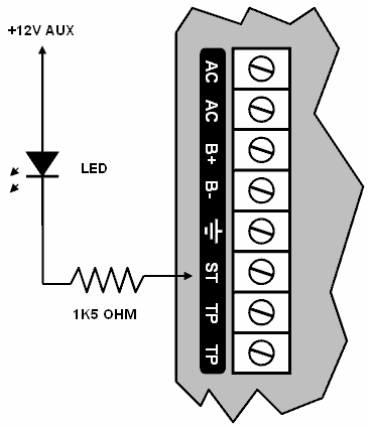


Figure 5 - External Status LED Connection

Encrypted Module Network

The Protégé Zone Expander incorporates encrypted RS-485 communications technology. The isolated communications interface offers full galvanic isolation to prevent ground loop noise and cross phase ground differential between network devices.

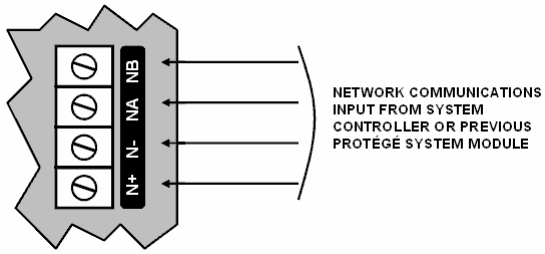


Figure 6 - Standard Communications Connection

Connection of the communications should be performed according to the diagram shown in figure 6. It is important that the N+ Network Communications Power be supplied from an independent battery backed power supply unit or a networked module capable of supplying the required voltage to all devices on the RS485 network.

Always connect the Zone Expanders NA and NB terminals to the NA and NB terminals of the communication network. The N+ and N- must go to a 12V power supply source as shown in the following diagram and connected at ONLY one +12V power source.

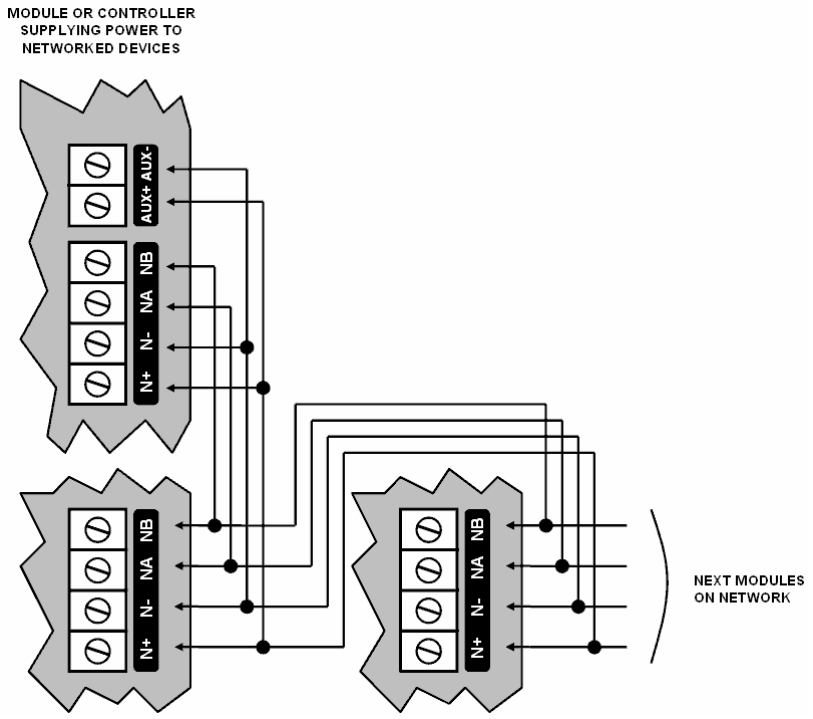
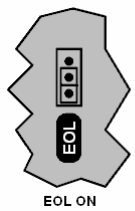


Figure 7 - Network Power Example Supplied By Module / Controller

The 12V N+ and N- Communication input must be supplied from only ONE point. Connections from more than one 12V supply may cause failure or damage to the Zone Expander or device supplying network power.

The EOL (End Of Line) jumper setting MUST be set in the ON position for the LAST module on the RS485 network. EOL is ON when the jumper is closest to the EOL text.



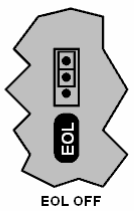


Figure 8 - EOL Jumper ON

Figure 9 - EOL Jumper OFF

ZONE INPUTS

Introduction

The Protégé Zone Expander has 16 Zone Inputs. The zone expander also monitors 16 trouble zones used to report trouble conditions. A trouble zone is in most cases not physically connected with a device, rather it is related within the system. For example a module communication fault causes a trouble zone to open as a result of the communication failure.

Zone Inputs

The Protégé Zone Expander can monitor the state of up to 16 zone inputs such as magnetic contacts, motion detectors and temperature sensors. Devices connected to these zones can be installed to a maximum distance of 300m (1000ft) from the Controller when using 22 AWG. The Controller supports normally opened and normally closed configurations with or without EOL resistors on a per zone configuration setting.

Zones can be programmed from the Protégé LCD Keypad (PRT-KLCD) or using the Protégé System Management Suite (PRT-SMGT). ZX001:01 to ZX001:16 represent Zone 1 to Zone 16 on the Protégé Zone Expander (Substitute the module address for the appropriate address being programmed).

When using a zone with the EOL resistor configuration, the controller generates an alarm condition when the state of a zone changes and generates a tamper alarm condition when a wire fault (short circuit) or a cut wire (tampered) in the line occurs.

When using the EOL resistor configuration, the EOL resistor option must be turned on for the zone(s) so that the tamper and short states can be monitored (refer to Zones Section in the Protégé Reference Manual).

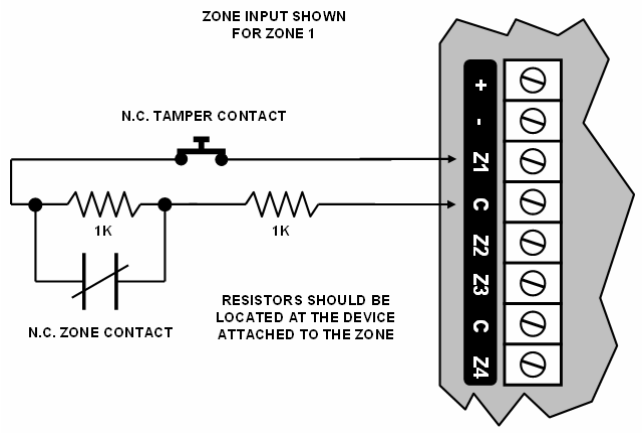


Figure 10 - EOL Resistor Zone Configuration

Each zone input can use a different input configuration. To program a large number of zones, with a single configuration type, use the Multiple Selection feature in the Protégé System Management Suite application.

When using the No Resistor configuration, the Controller only monitors the opened and closed state of the connected input device generating the (OPEN) Alarm and (CLOSED) Sealed conditions.

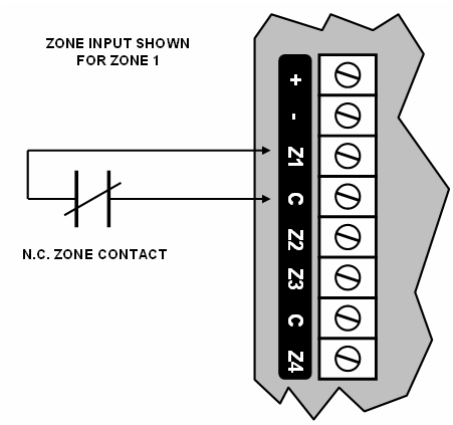


Figure 11 - Normally Closed Zone Configuration No Resistors

Trouble Zone Inputs

Each zone expander can monitor up to 16 trouble zones. Trouble zones are used to monitor the status of the zone expander and in most cases are not physically connected to an external zone. For example, trouble zone ZX001:05 is used to monitor bell PGM output 1 for a tamper condition and will generate an alarm state if the bell is removed or tampered.

The following table details the trouble zones that are configured in the system and the trouble type and group that they activate.

Zone Number	Description	Type	Group
RDxxx:01	Module Tamper	System Tamper	System
RDxxx:02	AC failure	Power Fault	General
RDxxx:03	Low Battery	Power Fault	General
RDxxx:04	Aux Failure	Power Fault	General
RDxxx:05	Bell 1 Tamper	System Tamper	System
RDxxx:06	Bell 2 Tamper	System Tamper	System
RDxxx:07	Bell 1 Over Current	Power Fault	General
RDxxx:08	Bell 2 Over Current	Power Fault	General
RDxxx:09	Reserved	None	None
RDxxx:10	Reserved	None	None
RDxxx:11	Reserved	None	None
RDxxx:12	Reserved	None	None
RDxxx:13	Reserved	None	None
RDxxx:14	Reserved	None	None
RDxxx:15	Reserved	None	None
RDxxx:16	Module Offline	Module Offline	System

Replace the 'xxx' with the appropriate address of the zone expander that you are programming.

PROGRAMMABLE OUTPUTS

Introduction

The Protégé Zone Expander has 4 Programmable Outputs (PGM's). The PGM's are used to activate the Bell Sirens, Lighting Control and Relay Accessory Products.

Bell PGM Outputs (1 and 2)

The + and - terminals of Bell1 (PGM1 ZX001:01) and Bell2 (PGM2 ZX001:02) are used to power bell and audible siren devices that require a steady voltage output. The bell outputs supply 12Vdc when activated and support up to 2.8A inrush and 2A continuous operation. The bell output uses an electronically fused circuit and automatically shuts down if the current exceeds 2.8A.

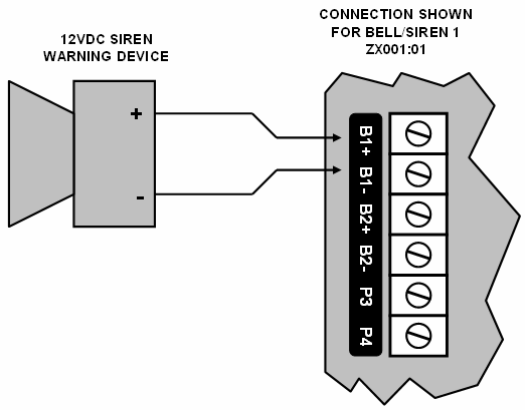


Figure 12 - Bell Output PGM1/2 Connection (PGM 1 Shown)

If the load on the bell terminals returns to normal (≤2A), the Zone Expander will reinstate power to the lock terminals when the PGM is deactivated and activated

When the bell output is not used, the appropriate trouble zone will be activated (refer to the Trouble Zone Input section on Page 14). To avoid this, connect a 1kΩ resistor across the bell output. If the bell is not being used for another function, and the trouble zone is not programmed in the system, no resistor is required.

Standard PGM Outputs (3 and 4)

The PGM outputs 3 and 4 on the Protégé Zone Expander are open collector outputs and switch to a ground connection.

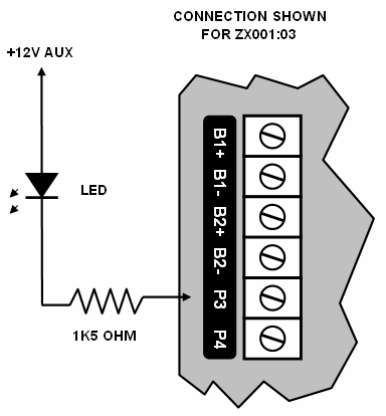


Figure 13 - Example Open Collector Output Connection (LED)

The PGM outputs 3 and 4 can switch to a maximum capacity of 50mA, exceeding this amount will damage the PGM output.

CONFIGURATION SWITCH

Introduction

The addressing of the Protégé Zone Expander allows up to 128 devices to be connected to the Protégé System Controller. The 'CONFIG' configuration DIP switch allows each Zone Expander to have a unique address.

Address Configuration

The switch positions 1 to 7 select the device address from 1 to 128. When setting an address the zone expander must be powered down (Battery and AC) and restarted for the new address to take affect. When changing the address the Zone Expander will automatically default the internal configuration and require a network update. See the Protégé System reference manual for information on performing a module update.

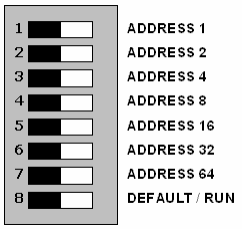


Figure 14 - Zone Expander CONFIG Switch Functions

The device address is determined by adding the value of each switch that is selected in the ON position and then adding 1 to this value. In the example below the address 079 results in (64+8+4+2) + 1 = 079. Setting all address switches to OFF results in the default address of 001.

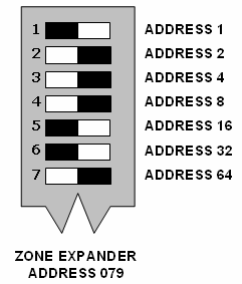


Figure 15 - Zone Expander Configured For Address 079

STATUS INDICATION

Introduction

The Protégé Zone Expander includes extensive diagnostic indicators that can aid the installer in diagnostic faults and conditions. In some cases an indicator may have multiple meanings depending on the status indicator display at the time.

Status Indicator

The Status Indicator is located in the centre of the PCB and indicates the status of the Protégé zone expander. If the Protégé Zone Expander is operating normally the LED will indicate this by **FLASHING** at 1 second intervals. **FLASHING** rapidly at 250ms intervals indicates that the Zone Expander is attempting to register with the system controller, or that communication has failed and the Zone Expander is retrying the request.

When the fault indicator is ON the status indicator will show an error code. Refer to the section *Error Code Display* on page 20 for more information.

Fault Indicator

The fault indicator LED is identified by the text 'FAULT' and is located in the centre of the PCB. When the fault indicator is **FLASHING** the Zone Expander is operating in firmware update mode, or there is no firmware loaded. The fault indicator when **ON** indicates that an error has occurred while trying to register with the system controller. The status indicator will flash a number of times indicating an error code. Refer to the section Error Code Display on page 20 for more information.

Charge/Test Indicator

The charge and test indicator serves two functions; it will indicate that a Battery Test is in progress and that Battery Charging is being performed. When AC is present the battery charging current will be indicated by a varying **INTENSITY** level on this indicator. This indicator will be **ON** when a battery test is in progress by illuminating brightly for 30 seconds every 10 minutes.

This indicator is identified by the text 'CHARGE/TEST'. This indicator does not function when no AC is present. For more information refer to the *Battery Backup* section on page 9.

Auxiliary OK Indicator

Auxiliary voltage is supplied to the AUX+ outputs through the auxiliary fuse. If auxiliary supply is normal the 'AUX OK' indicator will be **ON**. If the auxiliary fuse is damage the 'AUX OK' indicator will be **OFF**.

AC OK Indicator

When a valid AC input is provided to the Protégé System Controller the 'AC OK' indicator will be **ON**. When the AC is disconnected or has failed the 'AC OK' indicator is **OFF**.

5V Isolated Power Indicator

The Zone Expander communicates using an isolated RS-485 interface for optimal performance and this requires an isolated supply on the N+ and N- terminals. When a valid power supply is input the '5V ISO' indicator will be **ON** for the interface.

Bell 1/Bell 2 Indicators

The Bell 1 and Bell 2 indicators will show the status of the Bell Output and the over current or circuit fault conditions.

ON	Bell is **ON**.
TWO FLASHES	Bell is **ON,** the circuit is in Over Current Protection or Fuse Blown.
THREE FLASHES	Bell is **OFF**, the circuit to the locking device is cut, damaged or tampered.

Network RX/TX Indicator

The Network Receive and Transmit Data indicators are located on the top right side of the PCB beside the network communication interface. The indicator shows when the Protégé Zone Expander is transmitting and receiving information from the module communications interface and is identified by the text 'RX' and 'TX'. When the indicator is **ON** data is being transmitted or received.

ERROR CODE INDICATION

Introduction

When the Zone Expander attempts to register or communicate with the system controller a registration error can be generated indicating that it was not successful.

Error Code Display

The following table is only valid if the FAULT indicator is **ON** and the STATUS indicator is **FLASHING.** If the fault indicator is **FLASHING** the Zone Expander requires a firmware update or is currently in firmware update mode.

The status indicator will **FLASH** with the error code number. The error code number is shown with a 250ms **ON** and **OFF** period (duty cycle) with a delay of 1.5 seconds between each display cycle.

STATUS FLASHING	ERROR DESCRIPTION
1	Unknown Error Code *The error code returned by the system controller could not be understood by the zone expander. Contact Integrated Control Technology.*
2	Firmware Version *The firmware version on the Zone Expander is not compatible with the system controller. To clear this error, update the module using LoadIt module update application.*
3	Address Too High *The Zone Expander address is above the maximum number of zone expanders available on the system controller. To clear this error change the address to one within the range set on the system controller, restart the Zone Expander by disconnecting the power.*
4	Address In Use *The Address is already in use by another zone expander. To clear this error set the address to one that is currently not occupied by a zone expander. Use the view network status command to list the attached devices, or the network update command to refresh the registered device list.*
5	Controller Secured Registration Not Allowed *Controller is not accepting any module registrations. To allow module registrations use the network secure command to change the secure setting to not secured.*
6	Serial Number Fault *The serial number in the device is not valid. Return the unit to the distributor for replacement.*
7	Locked Device *The Zone Expander or system controller is a locked device and can not communicate on the network. Return the unit to the distributor for replacement.*

ORDERING INFORMATION

Product Codes

Please use the following product codes when placing an order for the Protégé Zone Expander.

PRT-ZX16-PCB **Protégé 16 Zone Expander (PCB Only)**
Includes *Accessory Bag*

Manuals and literature are available at the Integrated Control Technology website in the documentation section. If you require manuals on CD-ROM please request a literature CD-ROM from the website.

WARRANTY

Introduction

The Protégé Zone Expander is covered under the Integrated Control Technology standard terms and warranty agreement. This document can be downloaded from the Integrated Control Technology web site or obtained by return fax.

Contact

Integrated Control Technology welcomes all feedback. Please visit our website or use the information below.

Integrated Control Technology

P.O. Box 302-340
North Harbour Post Centre
Auckland
New Zealand

Unit C,
6 Ascension Place
Mairangi Bay
Auckland
New Zealand

Phone: +64-9-476-7124
Fax: +64-9-476-7128

www.integratedcontroltechnology.com

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Unit C, 6 Ascension Place, Mairangi Bay, P.O. Box 302-340
North Harbour, Auckland, New Zealand.
Phone: +64 (9) 476 7124 • Fax: +64 (9) 476 7128
www.integratedcontroltechnology.com